

CLAIMS

1. (currently amended) A method for establishing a Multi Protocol Label Switching ("MPLS") label switched path by a first label switching device to a second, downstream label switching device in a communication network without using an explicit signaling protocol, the method comprising:
 - allocating a new MPLS label for the label switched path;
 - generating a labeled packet including the new label, including inserting the new label into the packet and setting an indicator in the packet to indicate that the packet is labeled; and
 - forwarding the labeled packet to the second, downstream label switching device.
2. (cancelled)
3. (previously amended) The method of claim 1, wherein the indicator is an ethertype field of the packet, and wherein setting the indicator in the packet to indicate that the packet is labeled comprises setting the ethertype field to a predetermined value.
4. (previously amended) The method of claim 1, wherein the indicator is a bit in a header field of the packet, and wherein setting the indicator in the packet to indicate that the packet is labeled comprises setting the bit to a predetermined value.
5. (original) The method of claim 1, further comprising:
 - adding a forwarding table entry to a forwarding table, the forwarding table entry mapping the new label to a forwarding equivalence class and outgoing interface for the label switched path.

6. (original) The method of claim 5, wherein the forwarding table is associated with the outgoing interface for the label switched path.

7. (original) The method of claim 1, further comprising:
terminating use of the label switched path; and
forwarding unlabeled packets to the second label switching device.

8. (original) The method of claim 7, further comprising:
removing a forwarding table entry from a forwarding table, the forwarding table entry mapping the new label to a forwarding equivalence class and outgoing interface for the label switched path.

9. (currently amended) A label switching device supporting Multi Protocol Label Switching ("MPLS") comprising:

an outgoing interface providing an interface for communicating with a second, downstream label switching device; and

packet processing logic operably coupled to allocate a new label for a new label switched path to the second label switching device and to forward a labeled packet including the new label and an indicator indicating that the labeled packet is MPLS labeled, to the second label switching device over the outgoing interface without first explicitly establishing the new label switched path to the second label switching device using a signaling protocol.

10. (previously amended) The label switching device of claim 9, wherein the packet processing logic comprises:

label switching logic operably coupled to decide to establish the new label switched path;

label allocation logic operably coupled to allocate the new label for the new label switched path; and

packet labeling logic operably coupled to insert the new label in the packet and set the indicator in the packet to indicate that the packet is labeled.

11. (original) The label switching device of claim 10, wherein the indicator is an ethertype field of the packet, and wherein the packet labeling logic is operably coupled to set the ethertype field to a predetermined value to indicate that the packet is labeled.

12. (original) The label switching device of claim 10, wherein the indicator is a bit in a header field of the packet, and wherein the packet labeling logic is operably coupled to set the bit to a predetermined value to indicate that the packet is labeled.

13. (original) The label switching device of claim 9, further comprising a forwarding table associated with the outgoing interface.

14. (original) The label switching device of claim 13, wherein the packet processing logic further comprises label switched path setup logic operably coupled to add a forwarding table entry to the forwarding table, the forwarding table entry mapping the new label to a forwarding equivalence class and the outgoing interface for the label switched path.

15. (original) The label switching device of claim 9, wherein the packet processing logic is operably coupled to forward unlabeled packets to the second label switching device over the outgoing interface upon deciding to stop using the label switched path.

16. (original) The label switching device of claim 15, wherein the packet processing logic is operably coupled to remove a forwarding table entry from a forwarding table associated with the outgoing interface, the forwarding table entry mapping the new label to a forwarding equivalence class and the outgoing interface for the label switched path.

17. (currently amended) A program product for use in a first multi-protocol label switching ("MPLS") device, the program product comprising packet processing logic coupled to allocate a new MPLS label for a new label switched path to a second, downstream label switching device and to forward a labeled packet including the new label and an indicator indicating that the labeled packet is labeled, to the second label switching device over an outgoing interface without first explicitly establishing the new label switched path to the second label switching device using a signaling protocol.

18. (previously amended) The program product label switching device of claim 19, wherein the packet processing logic comprises:

label switching logic programmed to decide to establish the new label switched path;

label allocation logic programmed to allocate the new label for the new label switched path; and

packet labeling logic programmed to insert the new label in the packet and set an the indicator in the packet to indicate that the packet is labeled.

19. (original) The program product of claim 18, wherein the indicator is an ether-type field of the packet, and wherein the packet labeling logic is programmed to set the ethertype field to a predetermined value to indicate that the packet is labeled.

20. (original) The program product of claim 18, wherein the indicator is a bit in a header field of the packet, and wherein the packet labeling logic is programmed to set the bit to a predetermined value to indicate that the packet is labeled.

21. (original) The program product of claim 17, wherein the packet processing logic further comprises label switched path setup logic programmed to add a forwarding table entry to a forwarding table, the forwarding table entry mapping the new label to a forwarding equivalence class and the outgoing interface for the label switched path.

22. (original) The program product of claim 17, wherein the packet processing logic is programmed to forward unlabeled packets to the second label switching device over the outgoing interface upon deciding to stop using the label switched path.

23. (original) The program product of claim 22, wherein the packet processing logic is operably coupled to remove a forwarding table entry from a forwarding table associated with the outgoing interface, the forwarding table entry mapping the new label to a forwarding equivalence class and the outgoing interface for the label switched path.

24. (currently amended) A method for establishing a multi-protocol label switched ("MPLS") path to a first label switching device in a communication network without using an explicit signaling protocol, the method comprising:

receiving a labeled packet including a new MPLS label and an indicator bit set to indicate that the labeled packet is labeled from a second, upstream label switching device; and

setting up the label switched path using the new label.

25. (cancelled)

26. (previously amended) The method of claim 24, wherein the indicator is an ethertype field of the packet, and wherein the ethertype field is set to a predetermined value to indicate that the packet is labeled.

27. (previously amended) The method of claim 24, wherein the indicator is a bit in a header field of the packet, and wherein the bit is set to a predetermined value to indicate that the packet is labeled.

28. (original) The method of claim 24, wherein setting up the label switched path using the new label comprises:

determining a forwarding equivalence class and outgoing interface for the packet based upon network layer addressing information in the packet; and
adding a forwarding table entry to a forwarding table, the forwarding table entry mapping the new label to the forwarding equivalence class and outgoing interface for the packet.

29. (original) The method of claim 26, further comprising:

forwarding the packet based upon the network layer addressing information in the packet.

30. (currently amended) A multi-protocol label switching ("MPLS") device comprising:

an incoming interface providing an interface for communicating with a second, upstream label switching device; and

packet processing logic operably coupled to receive a labeled packet including a new MPLS label and an bit indicator for indicating that the labeled packet is labeled, from the second label switching device over the incoming interface without first explicitly establishing the label switched path from the

second label switching device to the first label switching device using a signaling protocol and to set up the label switched path using the new label.

31. (original) The label switching device of claim 30, wherein the packet processing logic comprises:

label detection logic operably coupled to determine that the received packet is labeled;

label switching logic responsive to the label detection logic and operably coupled to determine that the labeled packet is not associated with an existing label switched path; and

label switched path setup logic responsive to the label switching logic and operably coupled to set up the label switched path using the new label.

32. (previously amended) The label switching device of claim 31, wherein the labeled packet includes the new label and the indicator indicating that the packet is labeled, and wherein the label detection logic is operably coupled to determine that the received packet is labeled based upon the indicator.

33. (original) The label switching device of claim 32, wherein the indicator is an ethertype field of the packet, and wherein the ethertype field is set to a predetermined value to indicate that the packet is labeled.

34. (original) The label switching device of claim 32, wherein the indicator is a bit in a header field of the packet, and wherein the bit is set to a predetermined value to indicate that the packet is labeled.

35. (original) The label switching device of claim 31, wherein the label switched path setup logic is operably coupled to determine a forwarding equivalence class and outgoing interface for the packet based upon network layer addressing information in the packet and add a forwarding table entry to a forwarding table,

the forwarding table entry mapping the new label to the forwarding equivalence class and outgoing interface for the packet.

36. (original) The label switching device of claim 31, further comprising:

routing logic responsive to the label switched path setup logic and operably coupled to forward the packet based upon the network layer addressing information in the packet.

37. (currently amended) A program product for use in a first multi-protocol label switching ("MPLS") device, the program product comprising packet processing logic programmed to receive a labeled packet including a new MPLS label and an indicator for indicating that the labeled packet is labeled, from ~~the~~ a second, upstream label switching device over an incoming interface without first explicitly establishing the label switched path from the second label switching device to the first label switching device using a signaling protocol and to set up the label switched path using the new label.

38. (original) The program product of claim 37, wherein the packet processing logic comprises:

label detection logic programmed to determine that the received packet is labeled;

label switching logic responsive to the label detection logic and programmed to determine that the labeled packet is not associated with an existing label switched path;
and

label switched path setup logic responsive to the label switching logic and programmed to set up the label switched path using the new label.

39. (previously amended) The program product of claim 38, wherein the labeled packet includes the new label and the indicator indicating that the packet is labeled, and wherein the label detection logic is programmed to determine that the received packet is labeled based upon the indicator.

40. (original) The program product of claim 39, wherein the indicator is an ethertype field of the packet, and wherein the ethertype field is set to a predetermined value to indicate that the packet is labeled.

41. (original) The program product of claim 39, wherein the indicator is a bit in a header field of the packet, and wherein the bit is set to a predetermined value to indicate that the packet is labeled.

42. (original) The program product of claim 38, wherein the label switched path setup logic is programmed to determine a forwarding equivalence class and outgoing interface for the packet based upon network layer addressing information in the packet and to add a forwarding table entry to a forwarding table, the forwarding table entry mapping the new label to the forwarding equivalence class and outgoing interface for the packet.

43. (original) The program product of claim 38, further comprising:
routing logic responsive to the label switched path setup logic and programmed to forward the packet based upon the network layer addressing information in the packet.

44. (currently amended) A communication system comprising a first multi-protocol label switching ("MPLS") device in communication with a second label switching device over a communication network, wherein the first label switching device and the second label switching device use a packet-driven mechanism to establish a label switched path from the first label switching device to the second

label switching device without first explicitly establishing the label switched path using a signaling protocol, and wherein the first label switching device is operably coupled to allocate a new MPLS label for the label switched path and to forward a labeled packet including the new label and an indicator for indicating that the labeled packet is labeled, to the second label switching device over the communication network upon deciding to establish a new label switched path to the second label switching device.

45. (previously amended) The communication system of claim 44, wherein the second label switching device is operably coupled to receive the labeled packet from the first label switching device and to set up the new label switched path using the new label from the labeled packet.

46. (original) The communication system of claim 45, wherein the first label switching device is operably coupled to forward unlabeled packets to the second label switching device upon deciding to remove the label switched path, and wherein the second label switching device is operably coupled to remove the label switched path.

47. (currently amended) A communication message for label allocation by an upstream device comprising a new multi-protocol label switching label for a label switched path to be established and a label indicator indicating that the protocol message is labeled.

48. (original) The communication message of claim 47, wherein the label indicator comprises an ethertype field having a predetermined value for indicating that the protocol message is labeled.

49. (original) The communication message of claim 47, wherein the label indicator comprises a bit in a header field.